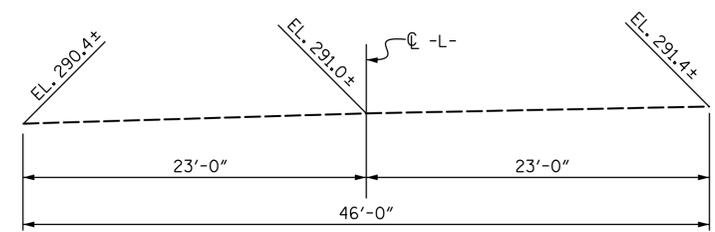
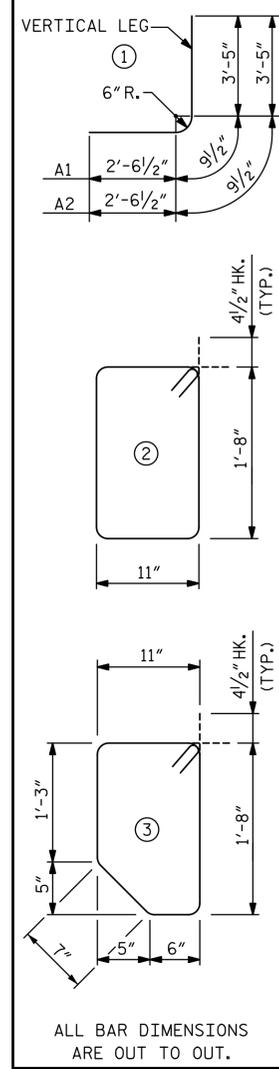


LOCATION SKETCH



PROFILE ALONG CULVERT

BAR TYPES



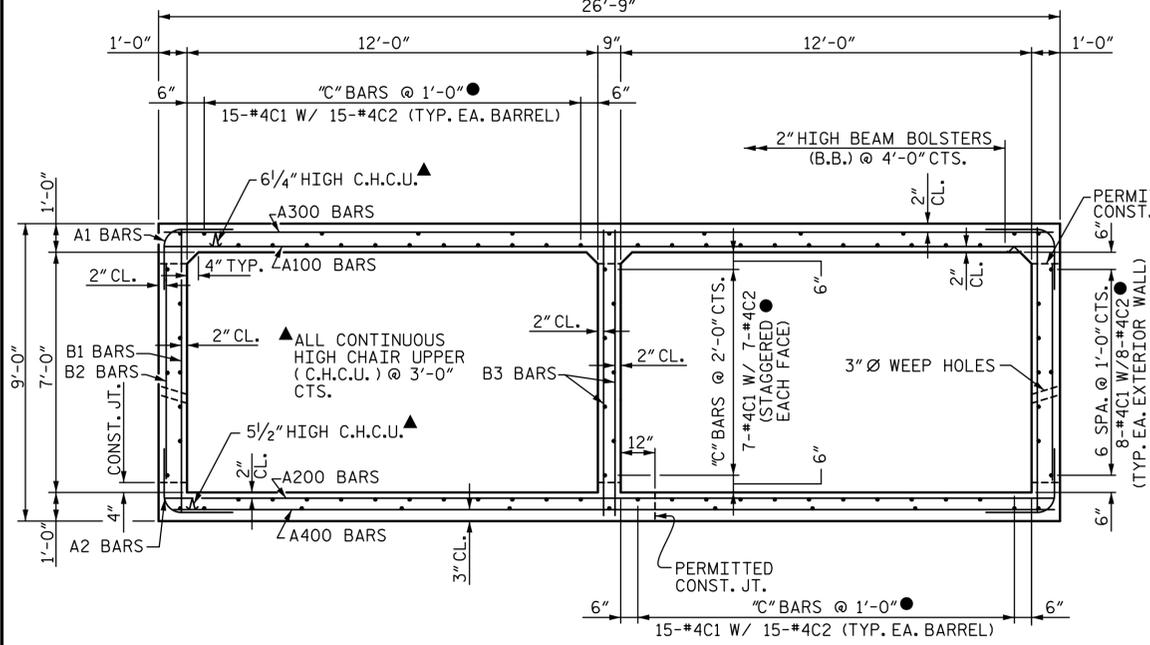
ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF REINFORCING FOR BARREL

MARK	NO.	SIZE	TYPE	LENGTH	WEIGHT	MARK	NO.	SIZE	TYPE	LENGTH	WEIGHT
A100	78	#5	STR	26'-5"	2,149	A400	78	#5	STR	26'-5"	2,149
A101	2	#5	STR	24'-8"	51	A401	2	#5	STR	24'-8"	51
A102	2	#5	STR	22'-9"	47	A402	2	#5	STR	22'-9"	47
A103	2	#5	STR	20'-11"	44	A403	2	#5	STR	20'-11"	44
A104	2	#5	STR	19'-11"	42	A404	2	#5	STR	19'-11"	42
A105	2	#5	STR	17'-2"	36	A405	2	#5	STR	17'-2"	36
A106	2	#5	STR	15'-4"	32	A406	2	#5	STR	15'-4"	32
A107	2	#5	STR	13'-5"	28	A407	2	#5	STR	13'-5"	28
A108	2	#5	STR	11'-7"	24	A408	2	#5	STR	11'-7"	24
A109	2	#5	STR	9'-9"	20	A409	2	#5	STR	9'-9"	20
A110	2	#5	STR	7'-10"	16	A410	2	#5	STR	7'-10"	16
A111	2	#5	STR	6'-0"	13	A411	2	#5	STR	6'-0"	13
A112	2	#5	STR	4'-1"	9	A412	2	#5	STR	4'-1"	9
A113	2	#5	STR	2'-2"	5	A413	2	#5	STR	2'-2"	5
A200	78	#5	STR	26'-5"	2,149	A1	182	#5	①	6'-9"	1,281
A201	2	#5	STR	24'-8"	51	A2	182	#5	①	6'-9"	1,281
A202	2	#5	STR	22'-9"	47						
A203	2	#5	STR	20'-11"	44	B1	122	#4	STR	8'-7"	700
A204	2	#5	STR	19'-11"	42	B2	184	#5	STR	6'-4"	1,215
A205	2	#5	STR	17'-2"	36	B3	122	#4	STR	8'-7"	700
A206	2	#5	STR	15'-4"	32						
A207	2	#5	STR	13'-5"	28	C1	89	#4	STR	18'-2"	1,080
A208	2	#5	STR	11'-7"	24	C2	89	#4	STR	30'-0"	1,784
A209	2	#5	STR	9'-9"	20						
A210	2	#5	STR	7'-10"	16	D1	14	#6	STR	2'-7"	54
A211	2	#5	STR	6'-0"	13	D2	6	#6	STR	1'-7"	14
A212	2	#5	STR	4'-1"	9						
A213	2	#5	STR	2'-2"	5	G1	12	#6	STR	27'-4"	493
A300	78	#6	STR	26'-5"	3,095	S1	28	#4	②	5'-11"	111
A301	2	#6	STR	24'-8"	74	S2	28	#4	③	5'-8"	106
A302	2	#6	STR	22'-9"	68	S3	12	#6	STR	6'-0"	108
A303	2	#6	STR	20'-11"	63						
A304	2	#6	STR	19'-11"	60						
A305	2	#6	STR	17'-2"	52						
A306	2	#6	STR	15'-4"	46						
A307	2	#6	STR	13'-5"	40						
A308	2	#6	STR	11'-7"	35						
A309	2	#6	STR	9'-9"	29						
A310	2	#6	STR	7'-10"	24						
A311	2	#6	STR	6'-0"	18						
A312	2	#6	STR	4'-1"	12						
A313	2	#6	STR	2'-2"	7						
TOTAL BARREL REINFORCING STEEL =											20,098 LBS.

NOTES

ASSUMED LIVE LOAD ----- HL-93 OR ALTERNATE LOADING  
 DESIGN FILL----- 3.00'  
 THE RESIDENT ENGINEER SHALL CHECK THE LENGTH OF CULVERT BEFORE STAKING IT OUT TO MAKE CERTAIN THAT IT WILL PROPERLY TAKE CARE OF THE FILL.  
 THE EXISTING STRUCTURE CONSISTING OF A SINGLE 22'-4" TIMBER DECK ON TIMBER JOIST SPAN WITH A CLEAR ROADWAY WIDTH OF 19'-1", SUPPORTED BY YOUNG MASONRY ABUTMENTS, AND LOCATED AT THE PROPOSED STRUCTURE SHALL BE REMOVED.  
 REMOVAL OF THE EXISTING BRIDGE SHALL BE PERFORMED SO AS NOT TO ALLOW DEBRIS TO FALL INTO THE WATER. THE CONTRACTOR SHALL REMOVE THE BRIDGE AND SUBMIT PLANS FOR DEMOLITION IN ACCORDANCE WITH ARTICLE 402-2 OF THE STANDARD SPECIFICATIONS.  
 FOR OTHER DESIGN DATA AND NOTES, SEE STANDARD NOTE SHEET.  
 3"Ø WEEP HOLES INDICATED TO BE IN ACCORDANCE WITH THE SPECIFICATIONS.  
 CONCRETE IN CULVERTS TO BE POURED IN THE FOLLOWING ORDER:  
 1. WING FOOTINGS AND FLOOR SLAB INCLUDING 4" OF ALL VERTICAL WALLS.  
 2. REMAINING PORTIONS OF THE WALLS AND WINGS FULL HEIGHT AND SILLS AND BAFFLES.  
 3. ROOF SLAB AND HEADWALLS.  
 DIMENSIONS FOR WING LAYOUT AS WELL AS ADDITIONAL REINFORCING STEEL EMBEDDED IN BARREL ARE SHOWN ON WING SHEET (SHEET C-6 OF 6).  
 STEEL IN THE BOTTOM SLAB MAY BE SPLICED AT THE PERMITTED CONSTRUCTION JOINT AT THE CONTRACTOR'S OPTION. EXTRA WEIGHT OF STEEL DUE TO THE SPLICES SHALL BE PAID FOR BY THE CONTRACTOR.  
 AT THE CONTRACTOR'S OPTION, HE MAY SPLICE THE VERTICAL REINFORCING STEEL IN THE INTERIOR FACE OF EXTERIOR WALL AND BOTH FACES OF INTERIOR WALLS ABOVE LOWER WALL CONSTRUCTION JOINT. THE SPLICE LENGTH SHALL BE 3'-0" FOR #5 BARS AND 2'-5" FOR #4 BARS. EXTRA WEIGHT OF STEEL DUE TO THE SPLICES SHALL BE PAID FOR BY THE CONTRACTOR.  
 FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.  
 FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.  
 FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.  
 FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.  
 FOR CULVERT DIVERSION NOTES AND PAY ITEM, SEE EROSION CONTROL PLANS.  
 A 3 FOOT STRIP OF FILTER FABRIC SHALL BE ATTACHED TO THE FILL FACE OF THE WING COVERING THE ENTIRE LENGTH OF THE EXPANSION JOINT.  
 THE REQUIRED BEARING CAPACITY AT THE BASE OF THE CULVERT IS 1 TSF. THE REQUIRED BEARING CAPACITY SHALL BE VERIFIED.  
 EXCAVATE 1 FOOT BELOW CULVERT AND REPLACE WITH FOUNDATION CONDITIONING MATERIAL IN ACCORDANCE WITH ARTICLE 414 OF THE STANDARD SPECIFICATIONS.  
 THE SUBSTRUCTURE OF THE EXISTING BRIDGE INDICATED ON THE PLANS IS FROM THE BEST INFORMATION AVAILABLE. SINCE THIS INFORMATION IS SHOWN FOR THE CONVENIENCE OF THE CONTRACTOR, THE CONTRACTOR SHALL HAVE NO CLAIM WHATSOEVER AGAINST THE DEPARTMENT OF TRANSPORTATION FOR ANY DELAYS OR ADDITIONAL COST INCURRED BASED ON DIFFERENCES BETWEEN THE EXISTING BRIDGE SUBSTRUCTURE SHOWN ON THE PLANS AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.  
 FOR PLACEMENT OF NATURAL STREAM BED MATERIAL, SEE SPECIAL PROVISIONS.



RIGHT ANGLE SECTION OF BARREL

TOTAL STRUCTURE QUANTITIES	
REMOVAL OF EXISTING STRUCTURE AT STA 12+02.00	LUMP SUM
CULVERT EXCAVATION STA 12+02.00	LUMP SUM
FOUNDATION CONDITIONING MATERIAL	100 TONS
CLASS AA CONCRETE	2,703 CY/FT = 124.3 C.Y.
BARREL:	2,250 LBS.
WINGS, ETC.:	154.8 C.Y.
TOTAL:	22,348 LBS.
REINFORCING STEEL	20,098 LBS.
BARREL:	2,250 LBS.
WINGS, ETC.:	154.8 C.Y.
TOTAL:	22,348 LBS.
PLACEMENT OF NATURAL STREAM BED MATERIAL	LUMP SUM

HYDRAULIC DATA

DESIGN DISCHARGE: 650 CFS  
 FREQUENCY OF DESIGN FLOOD: 25 YRS.  
 DESIGN HIGH WATER ELEVATION: 298.2  
 DRAINAGE AREA: 1.31 SQ. MI.  
 BASIC DISCHARGE (Q100): 900 CFS  
 BASIC HIGH WATER ELEVATION: 299.48

OVERTOPPING FLOOD DATA

OVERTOPPING DISCHARGE: 800+ CFS  
 FREQUENCY OF OVERTOPPING FLOOD: 50+ YRS.  
 OVERTOPPING FLOOD ELEVATION: 299.1

GRADE DATA

GRADE POINT ELEVATION @ STA. 12+02.00 -L- 299.15

BED ELEVATION @ STA. 12+02.00 -L- 290.48

ROADWAY FILL SLOPES 2:1 (MAX)

♦ CULVERT INVERT TO BE BURIED 1'-0"

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

I HEREBY CERTIFY THESE PLANS ARE THE AS-BUILT PLANS

PROJECT NO. 17BP.10.R.60  
 ANSON COUNTY  
 STATION: 12+02.00 -L-

REPLACES BRIDGE NO. 194

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 DOUBLE BARREL  
 12 FT. X 7 FT.  
 CONCRETE BOX CULVERT  
 105° SKEW



DRAWN BY: JWJ DATE: 12-14  
 CHECKED BY: BMC DATE: 1-15  
 DESIGN ENGINEER OF RECORD: BMC DATE: 1-15

THERE ARE 89 "C" BARS IN SECTION OF BARREL.  
 ♦ SPLICE LENGTH FOR C1/C2 BARS = 2'-5"

REVISIONS				SHEET NO.		
NO.	BY:	DATE:	NO.	BY:	DATE:	C-1
1			3			TOTAL SHEETS
2			4			6

STV ENGINEERS, INC.  
 900 West Trade St., Suite 715  
 Charlotte, NC 28202  
 NC License Number F-0991

## LOAD AND RESISTANCE FACTOR RATING (LRFR) SUMMARY FOR REINFORCED CONCRETE BOX CULVERTS

LEVEL	VEHICLE	WEIGHT (W) (TONS)	CONTROLLING LOAD RATING #	MINIMUM RATING FACTORS (RF)	TONS = W x RF	STRENGTH I LIMIT STATE								COMMENT NUMBER		
						LIVE LOAD FACTORS (%LL)	MOMENT				SHEAR					
							RATING FACTOR	BOX NO.	ELEMENT TYPE	DISTANCE FROM LEFT END OF ELEMENT (±)	RATING FACTOR	BOX NO.	ELEMENT TYPE		DISTANCE FROM LEFT END OF ELEMENT (±)	
DESIGN LOAD RATING	HL-93 (INVENTORY)	N/A	①	1.18	--	1.75	1.18	1 & 2	RCBC	12.00'	2.48	1 & 2	RCBC	0.72'		
	HL-93 (OPERATING)	N/A		1.53	--	1.35	1.53	1 & 2	RCBC	12.00'	3.22	1 & 2	RCBC	0.72'		
	HS-20 (INVENTORY)	36.000	②	1.18	42.48	1.75	1.18	1 & 2	RCBC	12.00'	2.48	1 & 2	RCBC	0.72'		
	HS-20 (OPERATING)	36.000		1.53	55.08	1.35	1.53	1 & 2	RCBC	12.00'	3.22	1 & 2	RCBC	0.72'		
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH	13.500		2.40	32.40	1.40	2.40	1 & 2	RCBC	6.00'	5.03	1 & 2	RCBC	0.72'	
		SNGARBS2	20.000		1.99	39.80	1.40	1.99	1 & 2	RCBC	0.00'	3.91	1 & 2	RCBC	0.72'	
		SNAGRIS2	22.000		1.84	40.48	1.40	1.84	1 & 2	RCBC	0.00'	3.79	1 & 2	RCBC	0.72'	
		SNCOTTS3	27.250		1.40	38.15	1.40	1.40	1 & 2	RCBC	6.00'	2.54	1 & 2	RCBC	0.72'	
		SNAGGRS4	34.925		1.23	42.96	1.40	1.23	1 & 2	RCBC	12.00'	2.40	1 & 2	RCBC	0.72'	
		SNS5A	35.550		1.22	43.37	1.40	1.22	1 & 2	RCBC	12.00'	2.60	1 & 2	RCBC	0.72'	
		SNS6A	39.950		1.23	49.14	1.40	1.23	1 & 2	RCBC	12.00'	2.62	1 & 2	RCBC	0.72'	
		SNS7B	42.000		1.19	49.98	1.40	1.19	1 & 2	RCBC	12.00'	2.62	1 & 2	RCBC	0.72'	
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3	33.000		1.29	42.57	1.40	1.29	1 & 2	RCBC	0.00'	2.83	1 & 2	RCBC	0.72'	
		TNT4A	33.075		1.34	44.32	1.40	1.34	1 & 2	RCBC	0.00'	2.74	1 & 2	RCBC	0.72'	
		TNT6A	41.600		1.22	50.75	1.40	1.22	1 & 2	RCBC	12.00'	2.56	1 & 2	RCBC	0.72'	
		TNT7A	42.000		1.14	47.88	1.40	1.14	1 & 2	RCBC	0.00'	2.72	1 & 2	RCBC	0.72'	
		TNT7B	42.000		1.25	52.50	1.40	1.25	1 & 2	RCBC	0.00'	2.61	1 & 2	RCBC	0.72'	
		TNAGRIT4	43.000		1.06	45.58	1.40	1.06	1 & 2	RCBC	12.00'	2.35	1 & 2	RCBC	0.72'	
		TNACT5A	45.000		1.18	53.10	1.40	1.18	1 & 2	RCBC	0.00'	2.45	1 & 2	RCBC	0.72'	
TNACT5B	45.000	③	1.01	45.45	1.40	1.01	1 & 2	RCBC	0.00'	2.16	1 & 2	RCBC	0.72'			

### LOAD FACTORS:

#### DESIGN LOAD RATING FACTORS

LOAD TYPE	MAX FACTOR	MIN FACTOR
DC	1.25	0.90
DW	1.50	0.65
EV	1.30	0.90
EH	1.35	0.90
ES	1.35	0.90
LS	1.75	--
WA	1.00	--

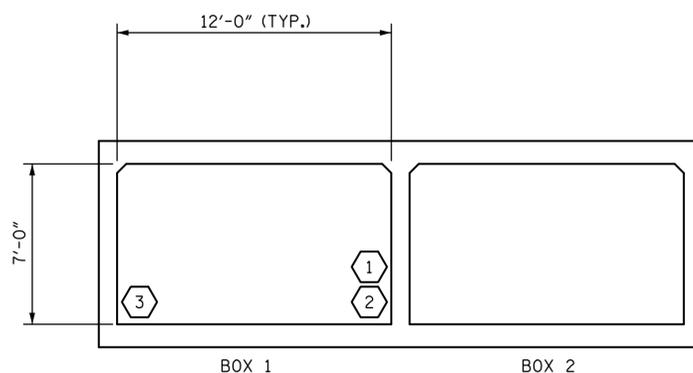
### NOTE:

RATING FACTORS ARE BASED ON THE STRENGTH I LIMIT STATE.

### COMMENTS:

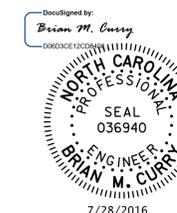
- 1.
- 2.
- 3.
- 4.

#	CONTROLLING LOAD RATING
①	DESIGN LOAD RATING (HL-93)
②	DESIGN LOAD RATING (HS-20)
③	LEGAL LOAD RATING **
	** SEE CHART FOR VEHICLE TYPE



**LRFR SUMMARY**  
(LOOKING DOWNSTREAM)

PROJECT NO. 17BP.10.R.60  
ANSON COUNTY  
 STATION: 12+02.00 -L-



STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

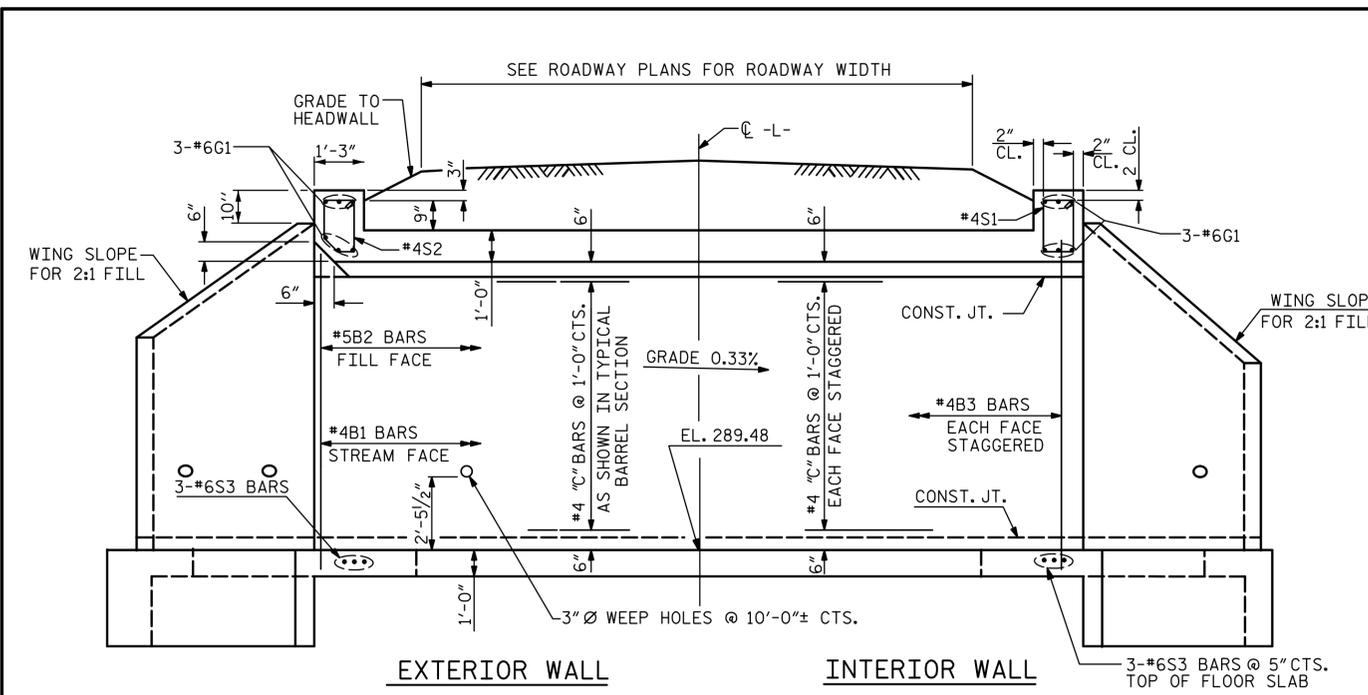
**LRFR SUMMARY FOR  
 REINFORCED CONCRETE  
 BOX CULVERTS  
 (NON-INTERSTATE TRAFFIC)**

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			C-2
2			4			TOTAL SHEETS 6

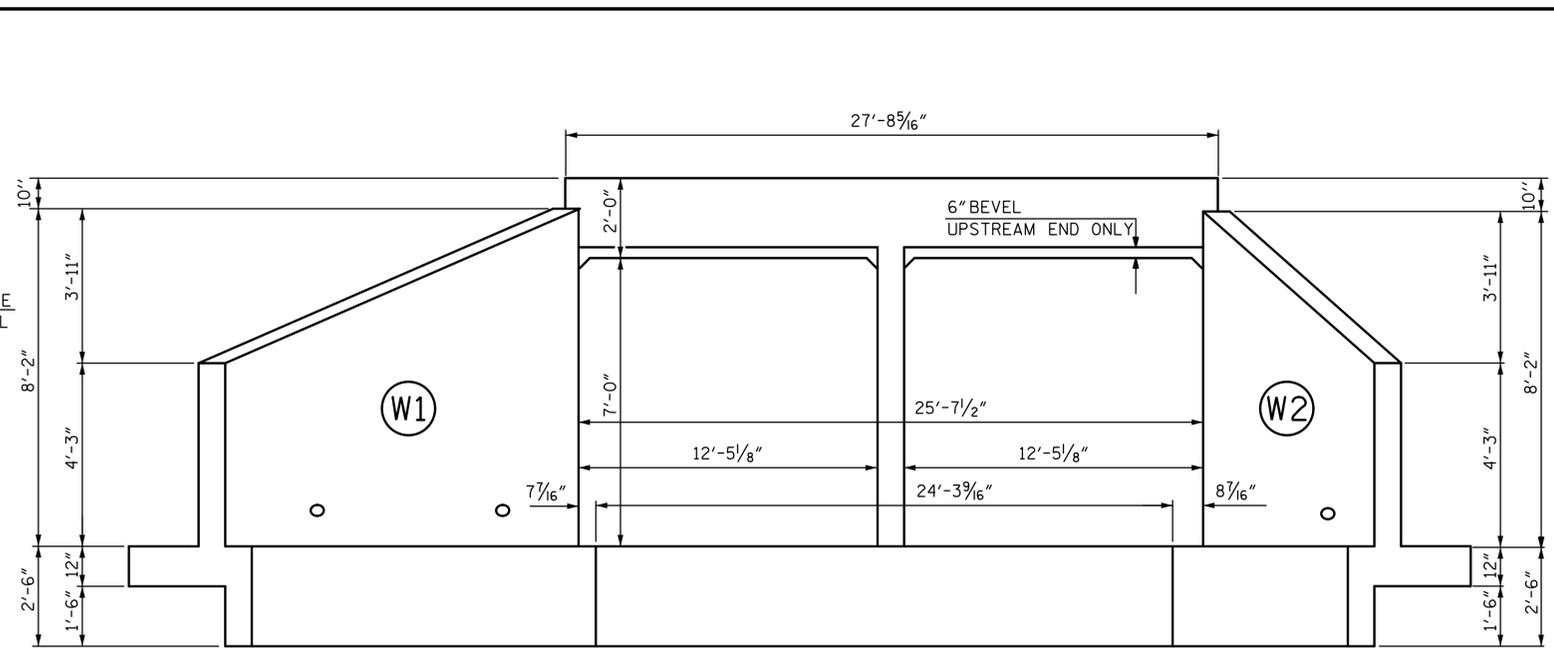
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 FINAL UNLESS ALL  
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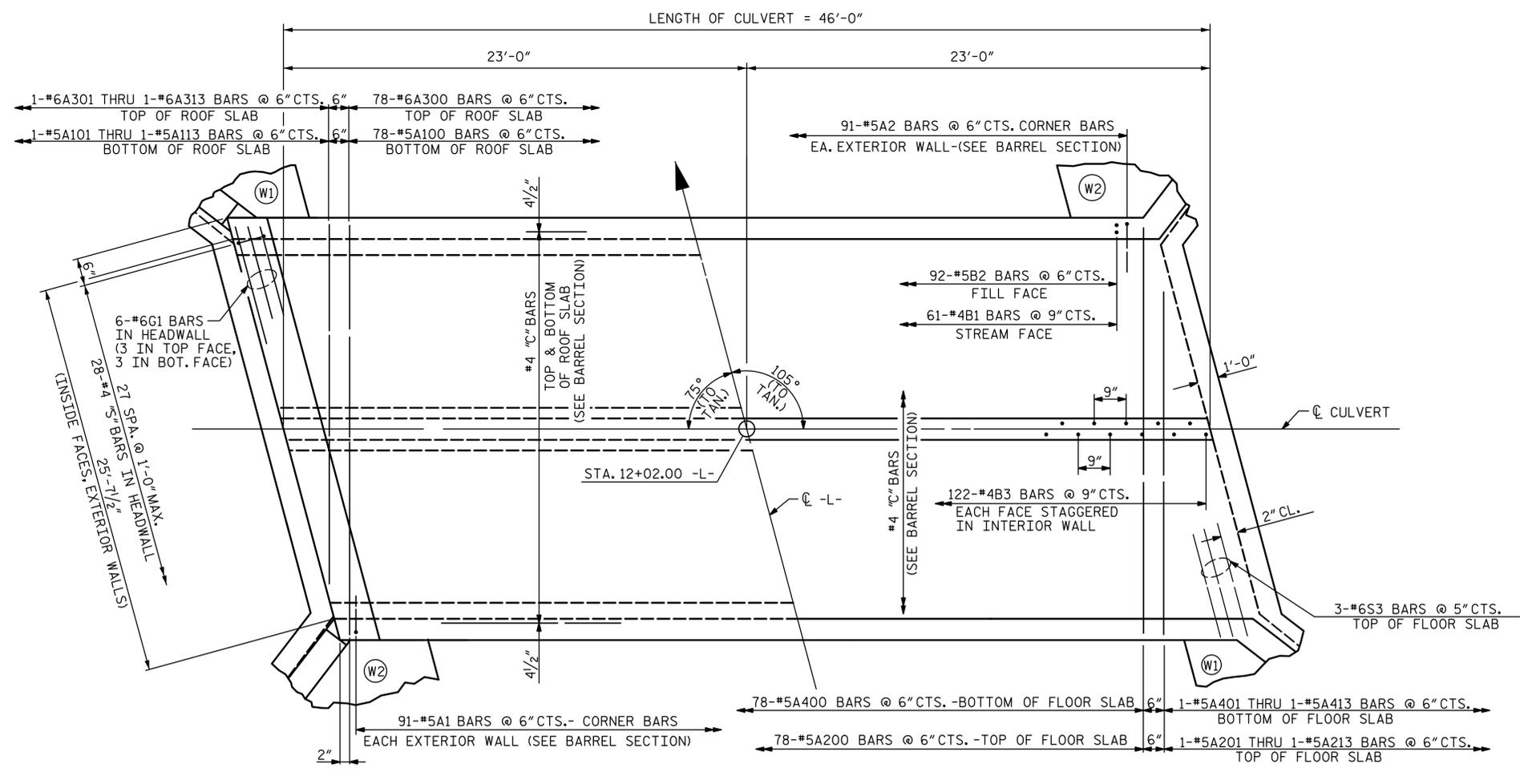
DRAWN BY: JWJ DATE: 12-14  
 CHECKED BY: BMC DATE: 1-15  
 DESIGN ENGINEER OF RECORD: BMC DATE: 1-15



EXTERIOR WALL INTERIOR WALL  
**CULVERT SECTION NORMAL TO ROADWAY**



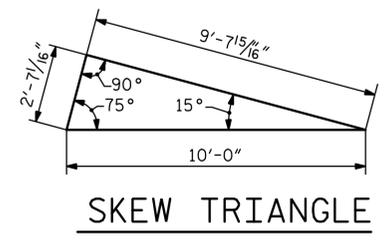
**END ELEVATION NORMAL TO SKEW**  
 (LOOKING DOWNSTATION)



**PART PLAN - ROOF SLAB**

**PART PLAN - FLOOR SLAB**

SILLS AND BAFFLES NOT SHOWN, FOR SILL AND BAFFLE LOCATIONS AND DETAILS SEE SHEET C-4 OF 6.

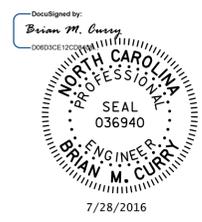


**SKEW TRIANGLE**

PROJECT NO. 17BP.10.R.60  
ANSON COUNTY  
 STATION: 12+02.00 -L-

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

**DOUBLE BARREL  
 12 FT. X 7 FT.  
 CONCRETE BOX CULVERT  
 105° SKEW**



7/28/2016

DRAWN BY : JWJ DATE : 12-14  
 CHECKED BY : BMC DATE : 1-15  
 DESIGN ENGINEER OF RECORD : BMC DATE : 1-15

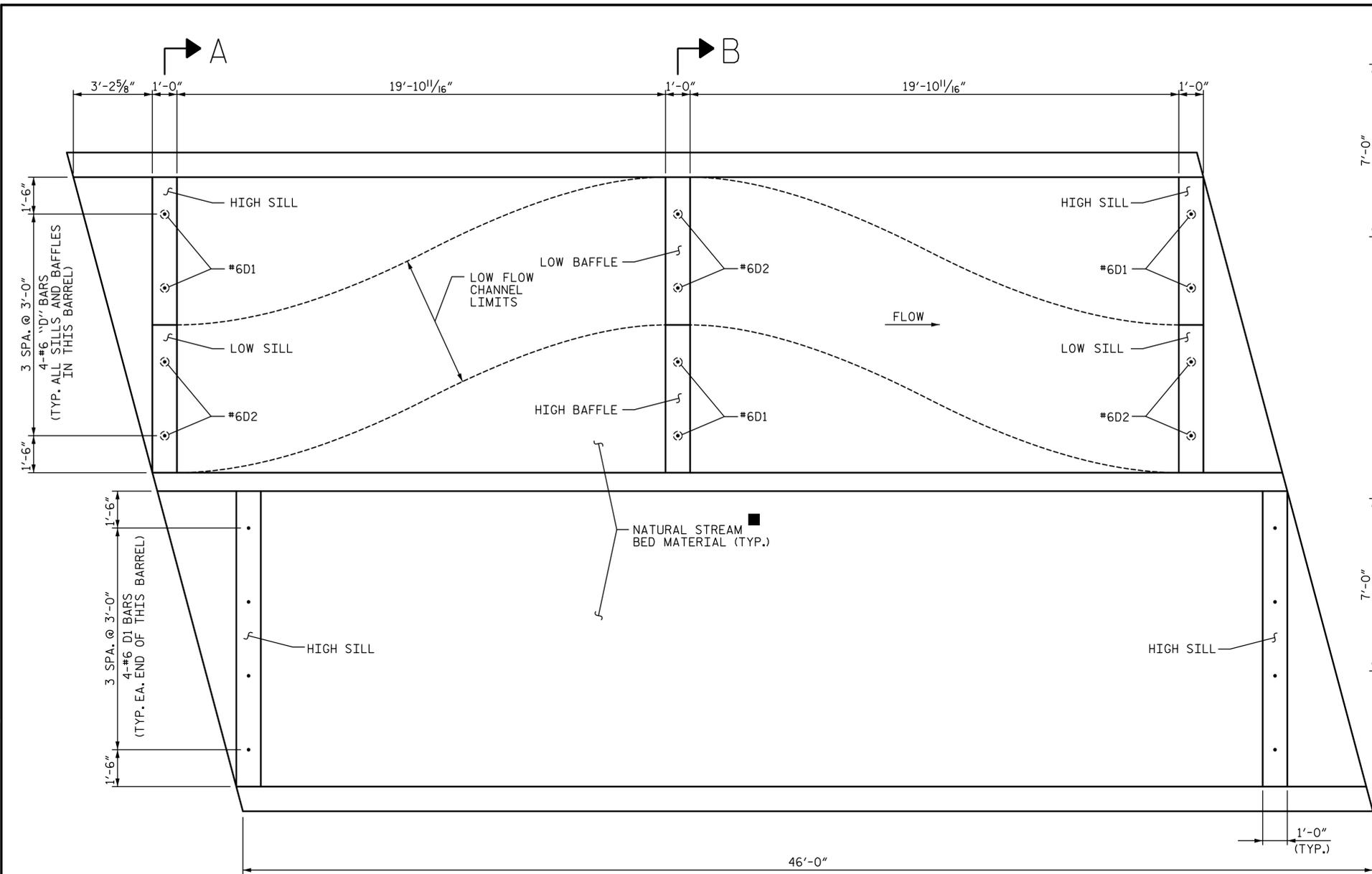
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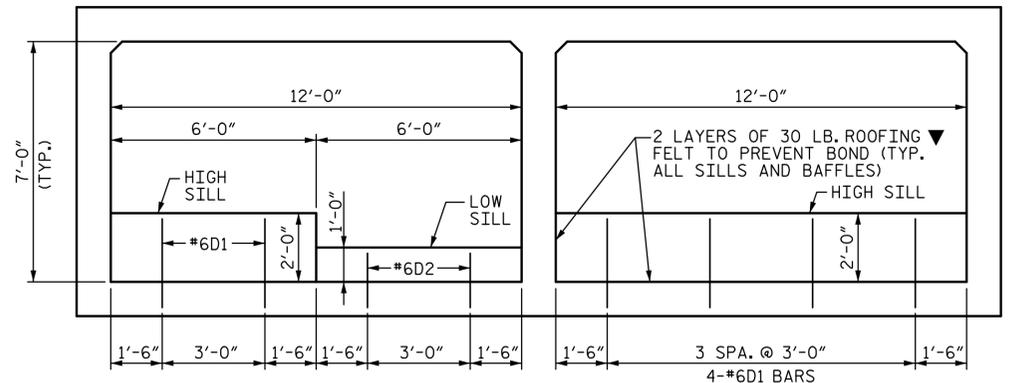
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C-3  
 TOTAL SHEETS 6



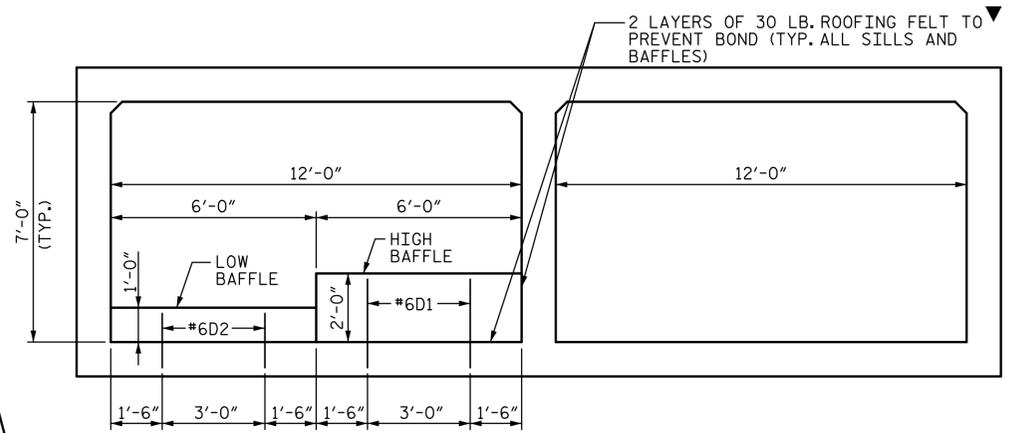
PLAN VIEW - LOCATION OF SILLS & BAFFLES

■ NATURAL STREAM BED MATERIAL SHALL BE USED TO BACKFILL THE CULVERT BETWEEN SILLS AND BAFFLES. SEE SPECIAL PROVISION FOR "PLACEMENT OF NATURAL STREAM BED MATERIAL".



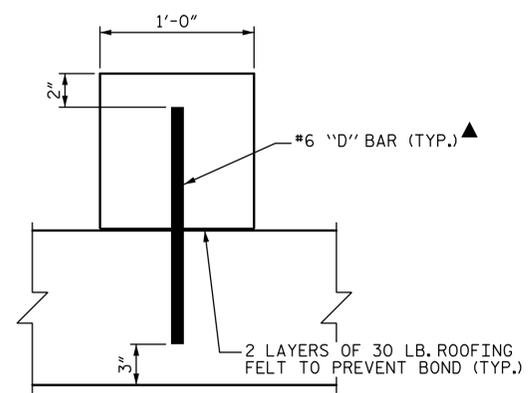
SECTION A-A

SECTION AT INLET SHOWN. SECTION AT OUTLET SIMILAR.  
 ▼ THE COST OF THE ROOFING FELT IS INCIDENTAL AND SHALL BE INCLUDED IN THE VARIOUS PAY ITEMS.



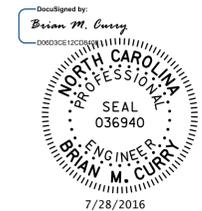
SECTION B-B

▼ THE COST OF THE ROOFING FELT IS INCIDENTAL AND SHALL BE INCLUDED IN THE VARIOUS PAY ITEMS.



SECTION THROUGH SILL OR BAFFLE

PROJECT NO. 17BP.10.R.60  
ANSON COUNTY  
 STATION: 12+02.00 -L-



STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

**CULVERT SILL AND BAFFLE DETAILS**

REVISIONS				SHEET NO.	
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		

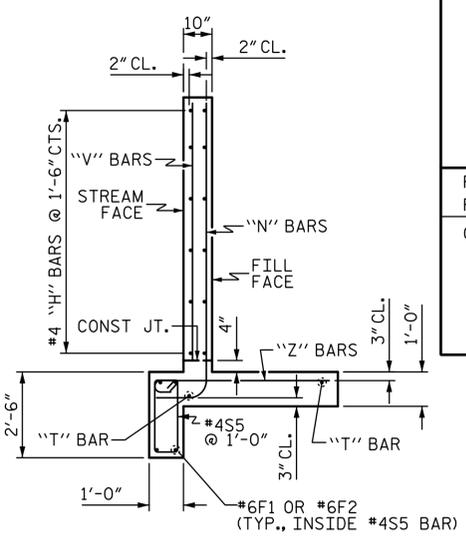
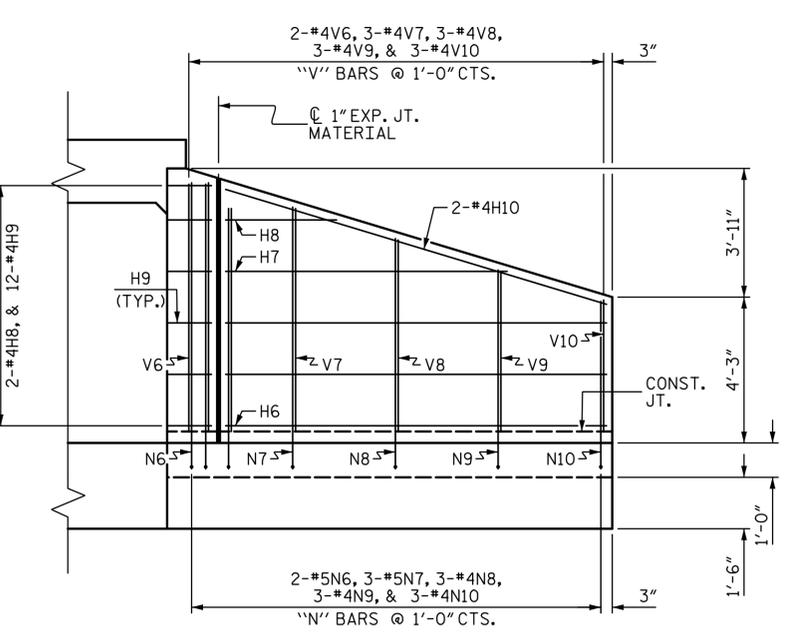
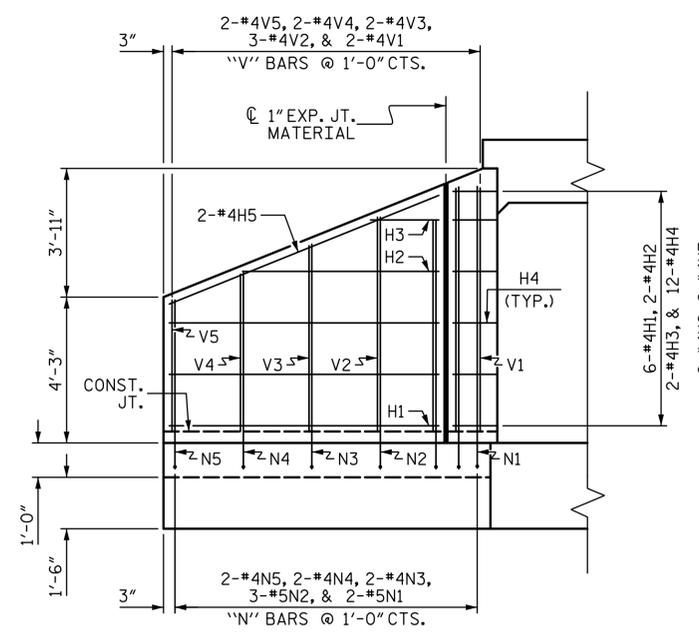
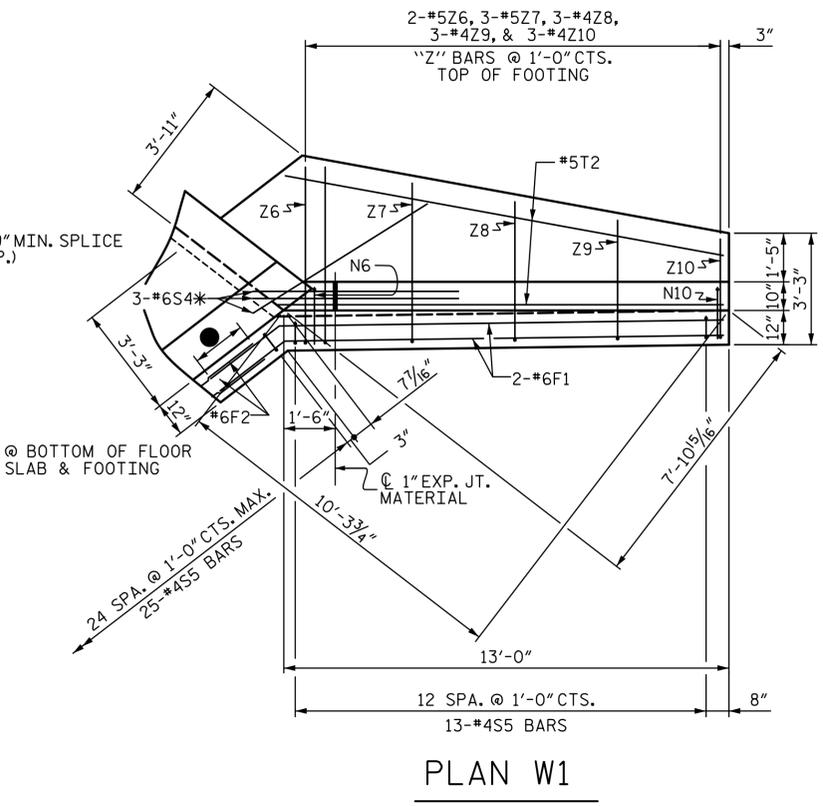
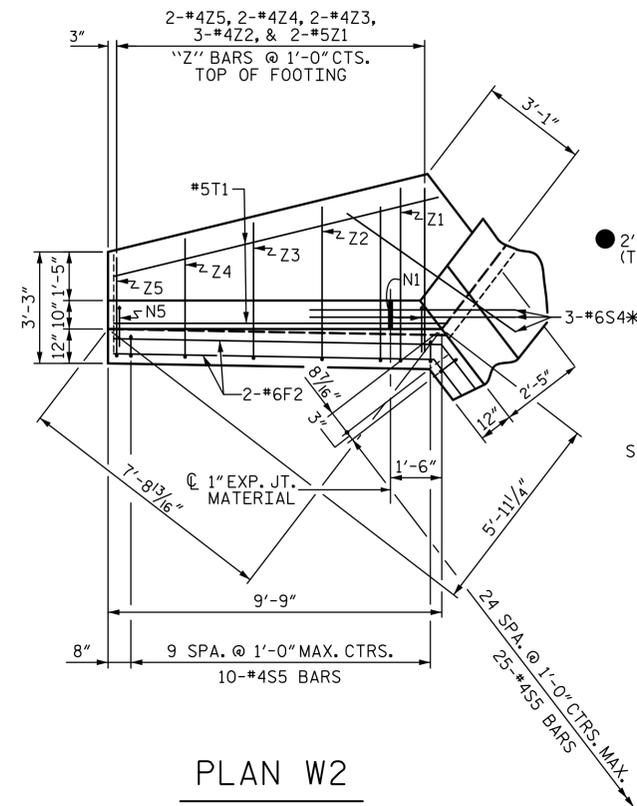
C-4  
 TOTAL SHEETS: 6

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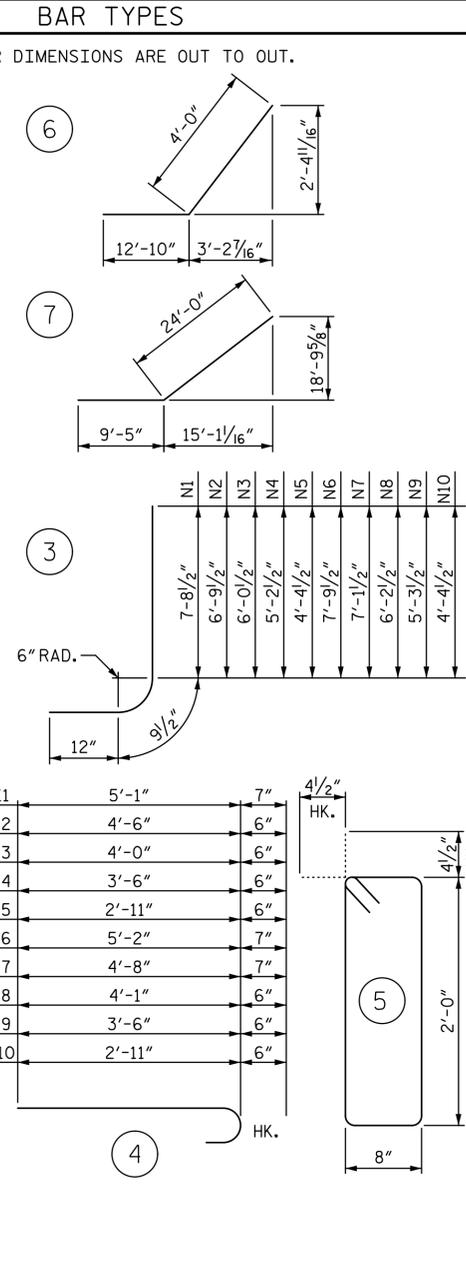
DRAWN BY : JWJ DATE : 12-14  
 CHECKED BY : BMC DATE : 1-15  
 ENGINEER OF RECORD : BMC DATE : 1-15

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**STV** 100 Years  
 STV ENGINEERS, INC.  
 900 West Trade St., Suite 715  
 Charlotte, NC 28202  
 NC License Number F-0991



REINFORCING STEEL FOR 4 WINGS	2,250 LBS
CLASS AA CONCRETE	
4 WINGS	18.8 CY
2 HEADWALLS	2.6 CY
2 END CURTAIN WALLS	5.3 CY
SILLS & BAFFLES	3.8 CY
<b>TOTAL</b>	<b>30.5 CY</b>



BILL OF MATERIAL					
BAR NO.	NO.	SIZE	TYPE	LENGTH	WEIGHT
F1	8	#6	Ⓞ	16'-10"	202
F2	8	#6	Ⓡ	33'-5"	402
H1	12	#4	STR	7'-10"	63
H2	4	#4	STR	5'-8"	15
H3	4	#4	STR	2'-0"	5
H4	24	#4	Ⓛ	3'-3"	52
H5	4	#4	STR	8'-5"	22
H6	12	#4	STR	11'-1"	89
H7	4	#4	STR	8'-2"	22
H8	4	#4	STR	3'-3"	9
H9	24	#4	Ⓢ	3'-3"	52
H10	4	#4	STR	11'-7"	31
N1	4	#5	Ⓢ	9'-6"	40
N2	6	#5	Ⓢ	8'-7"	54
N3	4	#4	Ⓢ	7'-10"	21
N4	4	#4	Ⓢ	7'-0"	19
N5	4	#4	Ⓢ	6'-2"	16
N6	4	#5	Ⓢ	9'-7"	40
N7	6	#5	Ⓢ	8'-11"	56
N8	6	#4	Ⓢ	8'-0"	32
N9	6	#4	Ⓢ	7'-1"	28
N10	6	#4	Ⓢ	6'-2"	25
S4	12	#6	STR	6'-0"	108
S5	96	#4	Ⓢ	6'-1"	390
T1	4	#5	STR	9'-9"	41
T2	4	#5	STR	13'-0"	54
V1	4	#4	STR	7'-1"	19
V2	6	#4	STR	6'-3"	25
V3	4	#4	STR	5'-5"	14
V4	4	#4	STR	4'-7"	12
V5	4	#4	STR	3'-10"	10
V6	4	#4	STR	7'-3"	19
V7	6	#4	STR	6'-6"	26
V8	6	#4	STR	5'-7"	22
V9	6	#4	STR	4'-8"	19
V10	6	#4	STR	3'-10"	15
Z1	4	#5	Ⓢ	5'-8"	24
Z2	6	#4	Ⓢ	5'-0"	20
Z3	4	#4	Ⓢ	4'-6"	12
Z4	4	#4	Ⓢ	4'-0"	11
Z5	4	#4	Ⓢ	3'-5"	9
Z6	4	#5	Ⓢ	5'-9"	24
Z7	6	#5	Ⓢ	5'-3"	33
Z8	6	#4	Ⓢ	4'-7"	18
Z9	6	#4	Ⓢ	4'-0"	16
Z10	6	#4	Ⓢ	3'-5"	14

PROJECT NO. 17BP.10.R.60  
ANSON COUNTY  
STATION: 12+02.00 -L-

STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
RALEIGH  
WING WALLS  
FOR  
CONCRETE BOX CULVERT  
H = 7'-0" SLOPE = 2:1  
105° SKEW



REVISIONS				SHEET NO.
NO.	BY:	DATE:	NO.	DATE:
1			3	
2			4	

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DRAWN BY: JWJ DATE: 12-14  
CHECKED BY: BMC DATE: 1-15  
ENGINEER OF RECORD: BMC DATE: 1-15

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STV ENGINEERS, INC.  
100 West Trade St., Suite 715  
Charlotte, NC 28202  
NC License Number F-0991

C-5  
TOTAL SHEETS  
6

**NOTES**

THE GUARDRAIL ANCHOR ASSEMBLY FOR CULVERTS SHALL CONSIST OF THE FOLLOWING COMPONENTS :

- A. FERRULES SHALL BE MADE FROM STEEL MEETING THE REQUIREMENTS OF AASHTO M169, GRADE 12L14 AND SHALL HAVE A MINIMUM THREAD LENGTH OF 2 1/2".
- B. 4 - 1" Ø X 2 1/4" BOLTS WITH WASHERS. BOLTS SHALL CONFORM TO THE REQUIREMENTS OF ASTM A307. BOLTS AND WASHERS SHALL BE GALVANIZED. (AT THE CONTRACTOR'S OPTION, STAINLESS STEEL BOLTS AND WASHERS MAY BE USED AS AN ALTERNATE FOR THE 1" Ø X 2 1/4" GALVANIZED BOLTS AND WASHERS. THEY SHALL CONFORM TO OR EXCEED THE MECHANICAL REQUIREMENTS OF ASTM A307. THE USE OF THIS ALTERNATE SHALL BE APPROVED BY THE ENGINEER.)
- C. WIRE STRUTS SHOWN IN THE GUARDRAIL ANCHOR ASSEMBLY FOR CULVERTS DETAIL ARE MINIMUM ALLOWABLE SIZE AND SHALL HAVE A MINIMUM TENSILE STRENGTH OF 100,000 P.S.I. AS AN OPTION, A 1/16" Ø WIRE STRUT WITH A MINIMUM TENSILE STRENGTH OF 90,000 PSI IS ACCEPTABLE.

GUARDRAIL ANCHOR ASSEMBLY WITH BOLTS SHALL BE ASSEMBLED IN THE SHOP. BOLT THREADS MAY BE RECUT AS NECESSARY TO INSURE FIT.

THE COST OF THE GUARDRAIL ANCHOR ASSEMBLY FOR CULVERTS, COMPLETE AND IN PLACE, SHALL BE INCLUDED IN THE UNIT CONTRACT PRICE BID FOR CLASS "AA" CONCRETE.

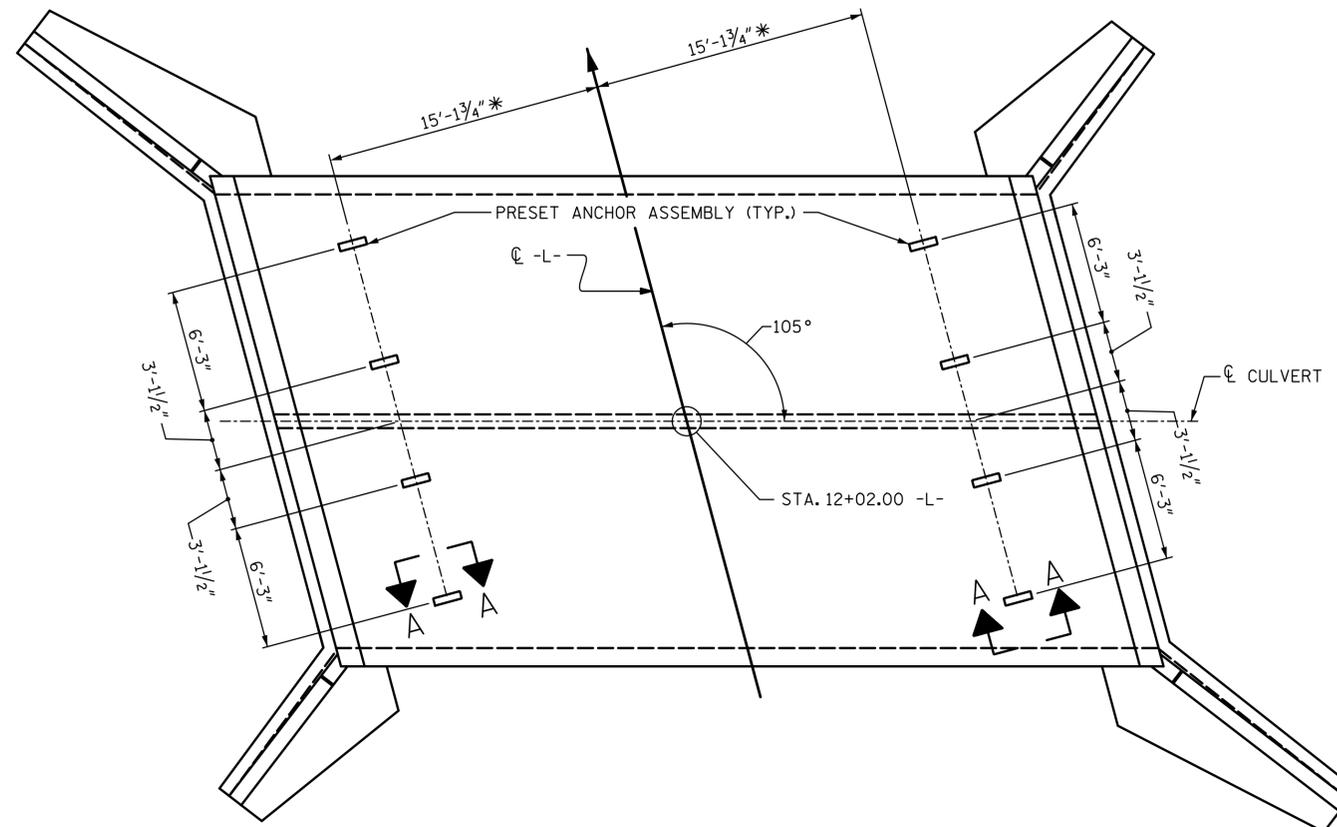
FERRULES TO BE PLUGGED DURING POURING OF SLAB AS RECOMMENDED BY THE MANUFACTURER.

AT THE CONTRACTOR'S OPTION, FERRULES WITH OPEN OR CLOSED ENDS MAY BE USED.

THE COST FOR GUARDRAIL, POSTS, AND POST BASE PLATES SHALL BE INCLUDED IN THE ROADWAY PAY ITEMS.

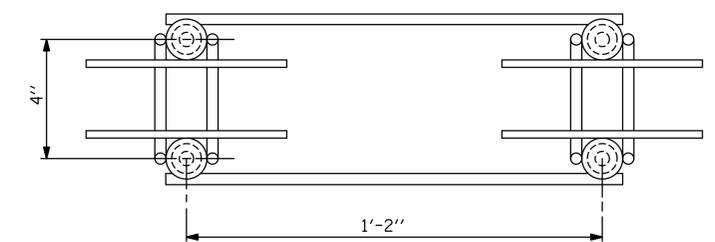
ROOF SLAB REINFORCING STEEL MAY BE SHIFTED AS NECESSARY TO CLEAR GUARDRAIL ANCHOR ASSEMBLY. CARE SHALL BE TAKEN TO MINIMIZE THE SHIFTING OF REINFORCING STEEL.

THE CONTRACTOR MAY USE ADHESIVELY ANCHORED ANCHOR BOLTS IN PLACE OF GUARDRAIL ANCHOR ASSEMBLY. LEVEL TWO FIELD TESTING IS REQUIRED, AND THE YIELD LOAD OF THE 1" Ø BOLT IS 21.8 KIPS. FOR ADHESIVELY ANCHORED ANCHOR BOLTS OR DOWELS, SEE STANDARD SPECIFICATIONS.

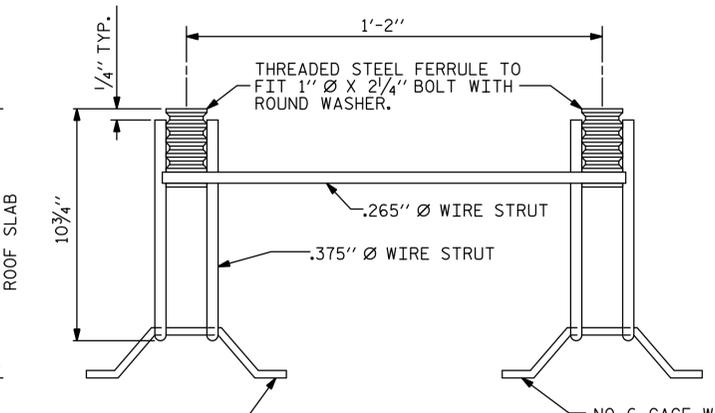


**PLAN**

SHOWING : GUARDRAIL ANCHOR ASSEMBLY SPACING.  
\* THIS DIMENSION TO BE CONFIRMED BY THE ENGINEER IN THE FIELD.



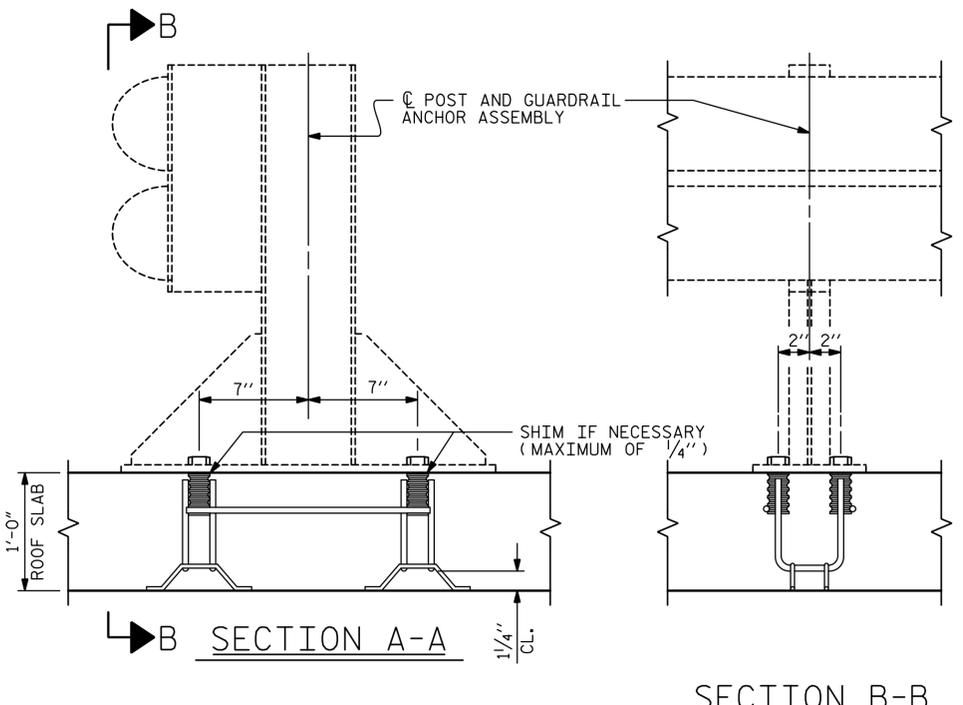
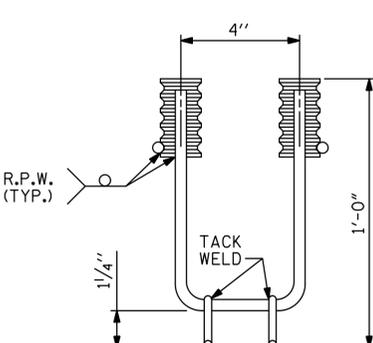
**PLAN**



**SIDE VIEW**

THIS SUPPORT SHALL MEET THE REQUIREMENTS AS SPECIFIED FOR SUPPORTS FOR REINFORCING STEEL. SEE SPECIFICATIONS.

**ELEVATION**



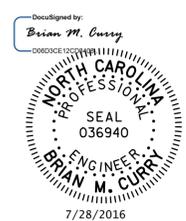
**SECTION A-A**

**SECTION B-B**

**GUARDRAIL ANCHOR ASSEMBLY FOR CULVERTS**

PROJECT NO. 17BP.10.R.60  
ANSON COUNTY  
STATION: 12+02.00 -L-

STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
RALEIGH  
STANDARD  
ANCHORAGE DETAILS FOR  
GUARDRAIL ANCHOR ASSEMBLY  
FOR CULVERTS



REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			C-6
2			4			TOTAL SHEETS 6

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## STANDARD NOTES

### DESIGN DATA:

SPECIFICATIONS	-----	A.A.S.H.T.O. (CURRENT)
LIVE LOAD	-----	SEE PLANS
IMPACT ALLOWANCE	-----	SEE A.A.S.H.T.O.
STRESS IN EXTREME FIBER OF		
STRUCTURAL STEEL - AASHTO M270 GRADE 36	-	20,000 LBS. PER SQ. IN.
- AASHTO M270 GRADE 50W	-	27,000 LBS. PER SQ. IN.
- AASHTO M270 GRADE 50	-	27,000 LBS. PER SQ. IN.
REINFORCING STEEL IN TENSION		
GRADE 60	--	24,000 LBS. PER SQ. IN.
CONCRETE IN COMPRESSION	-----	1,200 LBS. PER SQ. IN.
CONCRETE IN SHEAR	-----	SEE A.A.S.H.T.O.
STRUCTURAL TIMBER - TREATED OR		
UNTREATED - EXTREME FIBER STRESS	-----	1,800 LBS. PER SQ. IN.
COMPRESSION PERPENDICULAR TO GRAIN OF TIMBER	-----	375 LBS. PER SQ. IN.
EQUIVALENT FLUID PRESSURE OF EARTH	-----	30 LBS. PER CU. FT.
		(MINIMUM)

### MATERIAL AND WORKMANSHIP:

EXCEPT AS MAY OTHERWISE BE SPECIFIED ON PLANS OR IN THE SPECIAL PROVISIONS, ALL MATERIAL AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH THE 2012 "STANDARD SPECIFICATIONS FOR ROADS AND STRUCTURES" OF THE N. C. DEPARTMENT OF TRANSPORTATION.

STEEL SHEET PILING FOR PERMANENT OR TEMPORARY APPLICATIONS SHALL BE HOT ROLLED.

### CONCRETE:

UNLESS OTHERWISE REQUIRED ON PLANS, CLASS A CONCRETE SHALL BE USED FOR ALL PORTIONS OF ALL STRUCTURES WITH THE EXCEPTION THAT: CLASS AA CONCRETE SHALL BE USED IN BRIDGE SUPERSTRUCTURES, ABUTMENT BACKWALLS, AND APPROACH SLABS; AND CLASS B CONCRETE SHALL BE USED FOR SLOPE PROTECTION AND RIP RAP.

### CONCRETE CHAMFERS:

UNLESS OTHERWISE NOTED ON THE PLANS, ALL EXPOSED CORNERS ON STRUCTURES SHALL BE CHAMFERED 3/4" WITH THE FOLLOWING EXCEPTIONS: TOP CORNERS OF CURBS MAY BE ROUNDED TO 1-1/2" RADIUS WHICH IS BUILT INTO CURB FORMS; CORNERS OF TRANSVERSE FLOOR EXPANSION JOINTS SHALL BE ROUNDED WITH A 1/4" FINISHING TOOL UNLESS OTHERWISE REQUIRED ON PLANS; AND CORNERS OF EXPANSION JOINTS IN THE ROADWAY FACES AND TOPS OF CURBS AND SIDEWALKS SHALL BE ROUNDED TO A 1/4" RADIUS WITH A FINISHING STONE OR TOOL UNLESS OTHERWISE REQUIRED ON PLANS.

### DOWELS:

DOWELS WHEN INDICATED ON PLANS AS FOR CULVERT EXTENSIONS, SHALL BE EMBEDDED AT LEAST 12" INTO THE OLD CONCRETE AND GROUTED INTO PLACE WITH 1:2 CEMENT MORTAR.

### ALLOWANCE FOR DEAD LOAD DEFLECTION, SETTLEMENT, ETC. IN CASTING SUPERSTRUCTURES:

BRIDGES SHALL BE BUILT ON THE GRADE OR VERTICAL CURVE SHOWN ON PLANS. SLABS, CURBS AND PARAPETS SHALL CONFORM TO THE GRADE OR CURVE.

ALL DIMENSIONS WHICH ARE GIVEN IN SECTION AND ARE AFFECTED BY DEAD LOAD DEFLECTIONS ARE DIMENSIONS AT CENTER LINE OF BEARING UNLESS OTHERWISE NOTED ON PLANS. IN SETTING FORMS FOR STEEL BEAM BRIDGES AND PRESTRESSED CONCRETE GIRDER BRIDGES, ADJUSTMENTS SHALL BE MADE DUE TO THE DEAD LOAD DEFLECTIONS FOR THE ELEVATIONS SHOWN. WHERE BLOCKS ARE SHOWN OVER BEAMS FOR BUILDING UP TO THE SLAB, THE VERTICAL DIMENSIONS OF THE BLOCKS SHALL BE ADJUSTED BETWEEN BEARINGS TO COMPENSATE FOR DEAD LOAD DEFLECTIONS, VERTICAL CURVE ORDINATE, AND ACTUAL BEAM CAMBER. WHERE BOTTOM OF SLAB IS IN LINE WITH BOTTOM OF TOP FLANGES, DEPTH OF SLAB BETWEEN BEARINGS SHALL BE ADJUSTED TO COMPENSATE FOR DEAD LOAD DEFLECTION, VERTICAL CURVE ORDINATE, AND ACTUAL BEAM CAMBER.

IN SETTING FALSEWORK AND FORMS FOR REINFORCED CONCRETE SPANS, AN ALLOWANCE SHALL BE MADE FOR DEAD LOAD DEFLECTIONS, SETTLEMENT OF FALSEWORK, AND PERMANENT CAMBER WHICH SHALL BE PROVIDED FOR IN ADDITION TO THE ELEVATIONS SHOWN. AFTER REMOVAL OF THE FALSEWORK, THE FINISHED STRUCTURES SHALL CONFORM TO THE PROFILE AND ELEVATIONS SHOWN ON THE PLANS AND CONSTRUCTION ELEVATIONS FURNISHED BY THE ENGINEER.

DETAILED DRAWINGS FOR FALSEWORK OR FORMS FOR BRIDGE SUPERSTRUCTURE AND ANY STRUCTURE OR PARTS OF A STRUCTURE AS NOTED ON THE PLANS SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL BEFORE CONSTRUCTION OF THE FALSEWORK OR FORMS IS STARTED.

### REINFORCING STEEL:

ALL REINFORCING STEEL SHALL BE DEFORMED. DIMENSIONS RELATIVE TO PLACEMENT OF REINFORCING ARE TO CENTERS OF BARS UNLESS OTHERWISE INDICATED IN THE PLANS. DIMENSIONS ON BAR DETAILS ARE TO CENTERS OF BARS OR ARE OUT TO OUT AS INDICATED ON PLANS.

WIRE BAR SUPPORTS SHALL BE PROVIDED FOR REINFORCING STEEL WHERE INDICATED ON THE PLANS. WHEN BAR SUPPORT PIECES ARE PLACED IN CONTINUOUS LINES, THEY SHALL BE SO PLACED THAT THE ENDS OF THE SUPPORTING WIRES SHALL BE LAPPED TO LOCK LEGS ON ADJOINING PIECES.

### STRUCTURAL STEEL:

AT THE CONTRACTOR'S OPTION, HE MAY SUBSTITUTE 7/8" Ø SHEAR STUDS FOR THE 3/4" Ø STUDS SPECIFIED ON THE PLANS. THIS SUBSTITUTION SHALL BE MADE AT THE RATE OF 3 - 7/8" Ø STUDS FOR 4 - 3/4" Ø STUDS, AND STUD SPACING CHANGES SHALL BE MADE AS NECESSARY TO PROVIDE THE SAME EQUIVALENT NUMBER OF 7/8" Ø STUDS ALONG THE BEAM AS SHOWN FOR 3/4" Ø STUDS BASED ON THE RATIO OF 3 - 7/8" Ø STUDS FOR 4 - 3/4" Ø STUDS. STUDS OF THE LENGTH SPECIFIED ON THE PLANS MUST BE PROVIDED. THE MAXIMUM SPACING SHALL BE 2'-0".

EXCEPT AT THE INTERIOR SUPPORTS OF CONTINUOUS BEAMS WHERE THE COVER PLATE IS IN CONTACT WITH BEARING PLATE, THE CONTRACTOR MAY, AT HIS OPTION, SUBSTITUTE FOR THE COVER PLATES DESIGNATED ON THE PLANS COVER PLATES OF THE EQUIVALENT AREA PROVIDED THESE PLATES ARE AT LEAST 5/16" IN THICKNESS AND DO NOT EXCEED A WIDTH EQUAL TO THE FLANGE WIDTH LESS 2" OR A THICKNESS EQUAL TO 2 TIMES THE FLANGE THICKNESS. THE SIZE OF FILLET WELDS SHALL CONFORM TO THE REQUIREMENTS OF THE CURRENT ANSI/AASHTO/AWS "BRIDGE WELDING CODE". ELECTROSLAG WELDING WILL NOT BE PERMITTED.

WITH THE SOLE EXCEPTION OF EDGES AT SURFACES WHICH BEAR ON OTHER SURFACES, ALL SHARP EDGES AND ENDS OF SHAPES AND PLATES SHALL BE SLIGHTLY ROUNDED BY SUITABLE MEANS TO A RADIUS OF APPROXIMATELY 1/16 INCH OR EQUIVALENT FLAT SURFACE AT A SUITABLE ANGLE PRIOR TO PAINTING, GALVANIZING, OR METALLIZING.

### HANDRAILS AND POSTS:

METAL STANDARDS AND FACES OF THE CONCRETE END POSTS FOR THE METAL RAIL SHALL BE SET NORMAL TO THE GRADE OF THE CURB, UNLESS OTHERWISE SHOWN ON PLANS. THE METAL RAIL AND TOPS OF CONCRETE POSTS USED WITH THE ALUMINUM RAIL SHALL BE BUILT PARALLEL TO THE GRADE OF THE CURB.

METAL HANDRAILS SHALL BE IN ACCORDANCE WITH THE PLANS. RAILS SHALL BE AS MANUFACTURED FOR BRIDGE RAILING. CASTINGS SHALL BE OF A UNIFORM APPEARANCE. FINIS AND OTHER DEFORMATIONS RESULTING FROM CASTING OR OTHERWISE SHALL BE REMOVED IN A MANNER SO THAT A UNIFORM COLORING OF THE COMPLETED CASTING SHALL BE OBTAINED. CASTINGS WITH DISCOLORATIONS OR OF NON-UNIFORM COLORING WILL NOT BE ACCEPTED. CERTIFIED MILL REPORTS ARE REQUIRED FOR METAL RAILS AND POSTS.

### SPECIAL NOTES:

GENERALLY, IN CASE OF DISCREPANCY, THIS STANDARD SHEET OF NOTES SHALL GOVERN OVER THE SPECIFICATIONS, BUT THE REMAINDER OF THE PLANS SHALL GOVERN OVER NOTES HEREON, AND SPECIAL PROVISIONS SHALL GOVERN OVER ALL. SEE SPECIFICATIONS ARTICLE 105-4.

# ENGLISH

JANUARY, 1990